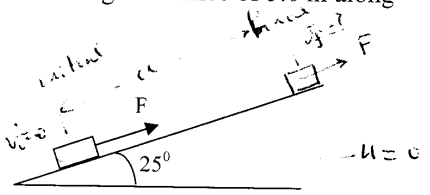
Physics 101Rec
Quiz#6-Sect 05
Chapter 8

Name: Key Id:

A 10 kg crate, starting from rest is pulled across an incline plane making an angle of 25° with the horizontal by a force F = 100 N as shown in the figure. The coefficient of friction between the crate and the floor is 0.3. Find the speed of the crate after moving a distance of 5.0 m along the incline plane.



use $\Delta K + \Delta U_g + \Delta U_s = W_f + W_{app}$

$\Delta K = K_f - K_i = \frac{1}{2} m v_f^2 - 0$

$\Delta U_g = U_f - U_i = mgh - 0 = mgd\sin\theta - 0 = 207.1\ J$

$W_f = -f_k d = -\mu_k N d = -\mu_k mg\cos\theta\, d = -133.2\ J$

$W_F = F d = 100 \times 5 = 500\ J$

$\frac{1}{2} m v_f^2 + 207.1 = -133.2 + 500$

$v_f^2 = 31.94 \Rightarrow \boxed{v_f = 5.7\ m/s}$